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IS 11516 (2005): Soft solder for electronic applications [MTD 9: Lead, Zinc, Cadmium, Tin, Antimony and their Alloys]

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इलैक्ट्रॉनी अनुप्रयोगों के लिए मृदु टाँका

(पहला पुनरीक्षण)

Indian Standard

SOFT SOLDER FOR ELECTRONIC APPLICATIONS — SPECIFICATION

(First Revision)

ICS 25.160.50; 77.120.60

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 2005

Price Group 2

Lead, Zinc, Cadmium, Tin, Antimony and Their Alloys Sectional Committee, MTD 9

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Lead, Zinc, Cadmium, Tin, Antimony and Their Alloys Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1985. While reviewing this standard in the light of experience gained during these years, the Committee decided to revise it to bring it in line with the present practices followed by the Indian industry.

In this revision following changes have been made:

a) Amendment number 1 has been incorporated;
b) Clause on reference of Indian Standard has been updated; and
c) Clause on marking has been modified.

Properties and applications of solders are given in Annex A for information.

Lead is known to be one of the toxic material directly responsible for many present day diseases and body poisoning. The levels of toxicants like lead are very high in the vicinity where soft/solder/solder wire are being manufactured. Therefore, utmost care is required to be taken to minimize the lead in work place air, ambient air and in the industrial effluents.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SOFT SOLDER FOR ELECTRONIC APPLICATIONS — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers the requirements of soft solders (antimonial and non-antimonial) in the form of sticks, bars and ingots for use in electronic applications.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
998	Methods of chemical analysis of soft solder (soft and rosin cored):
Part 1 : 1983	Determination of tin and antimony (*first revision*)
Part 2 : 1983	Determination of iron, copper and arsenic (*first revision*)
Part 3 : 1983	Determination of cadmium, zinc, aluminium, bismuth and nickel (*first revision*)
1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)

3 CONDITIONS OF SUPPLY

General requirements relating to the supply of soft solders shall be as laid down in IS 1387.

4 MANUFACTURE

Soft solder covered by this standard shall be manufactured from virgin metals or clean scrap.

5 CHEMICAL COMPOSITION

The material when analyzed chemically by the method specified in the relevant parts of IS 998 or any other established instrumental/chemical method shall be as given in Table 1. In case of dispute, the procedure given in IS 998 and its relevant parts shall be the referee method. However, where the method is not given in IS 998 or its relevant parts, the referee method shall be as agreed to between the purchaser and the manufacturer.

6 FORM AND SIZE

Soft solders may be supplied in any form and size, subject to agreement between the manufacturer and the purchaser.

7 FREEDOM FROM DEFECTS

Soft solders covered by this standard shall be uniform in quality and be clean and free from defects that will affect life, serviceability and appearance.

8 SAMPLING AND INSPECTION

8.1 An inspection lot shall consists of solder sticks, bars and ingots of the same type designation produced from the same batch of raw materials under essentially the same conditions.

8.2 Sample Size

Number of samples selected for testing shall be as per Table 2.

8.3 Saw cuts shall be made entirely across each piece at several points not more than 25 mm apart and evenly distributed throughout the length. No lubricant shall be used for sawing. Sawing thoroughly mixed shall constitute sample for chemical analysis.

8.4 Criteria for Acceptance

The sample shall be subjected to the tests specified in Table 3.

9 METHODS OF TEST

9.1 Visual and Dimensional

Soft solder sticks, bars and ingots shall be visually examined to verify that the dimensions, unit mass, packing, marking and freedom from defects shall be in accordance with applicable requirements as per Table 3.

10 RE-TEST

If the sample prepared fails to meet the requirements specified under 4, two more tests shall be conducted on the same sample. If both the test results satisfy the relevant requirements, the lot shall be accepted. Should either of the samples fails to comply with the requirements, the lot represented shall be rejected.

Table 1 Solder Alloy Compositions (Percent)

(*Clause* 5)

Sl No.	Grade	Tin	Lead	Antimony	Bismuth	Silver	Copper	Iron	Zinc	Aluminium	Cadmium	Arsenic	Total No. of all other Impurities
					Max	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i)	Sn 63	62.5-63.5	Remainder	0.2-0.5	0.25	0.015	0.08	0.02	0.003	0.001	0.001	0.03	0.08
ii)	Sn 63Af	62.5-63.5	Remainder	0.12 *Max*	0.25	–	0.08	0.02	0.003	0.001	0.001	0.03	0.08
iii)	Sn 62	61.5-62.5	Remainder	0.2-0.5	0.25	1.75-2.25	0.08	0.02	0.003	0.001	0.001	0.03	0.08
iv)	Sn 60	59.5-61.5	Remainder	0.2-0.5	0.25	0.015	0.08	0.02	0.003	0.001	0.001	0.03	0.08
v)	Sn 60Af	59.5-61.5	Remainder	0.12 *Max*	0.25	–	0.08	0.02	0.003	0.001	0.001	0.03	0.08
vi)	Sn 50	49.5-51.5	Remainder	0.2-0.5	0.25	0.015	0.08	0.02	0.003	0.001	0.001	0.03	0.08

NOTES

1 Grades Sn 63, Sn 60 and Sn 50 are antimonial solders.

2 Grades Sn 63Af and Sn 60Af are non-antimonial solders.

3 Grades Sn 62 is an antimonial silver solder.

Table 2 Scale of Sampling

(*Clause* 8.2)

Sl No.	Size of Lot kg	No. of Samples
(1)	(2)	(3)
i)	Up to 450	3
ii)	450 - 4 500	5
iii)	Above 4 500	10

Table 3 Criteria for Acceptance

(*Clauses* 8.4 *and* 9.1)

Sl No.	Property	Requirement, Ref to Clause No.	Test Method
(1)	(2)	(3)	(4)
i)	*Visual and Dimensional.*		
	1) Form and size	6	9.1
	2) Freedom from defects	7	
	3) Packing	11.1	
	4) Marking	11.2	
ii)	*Material*		
	Alloy composition (*see* Table 1)	5	Relevant Parts of IS 998

11 PACKING AND MARKING

11.1 Soft solder sticks/bars/ingots covered by this standard shall be packed in wooden boxes to facilitate case in transport and prevent damage in transit. The gross mass of each box shall not exceed 50 kg.

11.2 Each solder stick/bar/ingot shall be legibly marked with the following data:

a) Cast number,
b) Grade, and
c) Manufacturer's name or trade-mark.

11.3 BIS Certification Marking

The material may also be marked with the Standard Mark.

11.3.1 The use of the Standard Mark is governed by the provision of *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Foreword*)

PROPERTIES AND APPLICATIONS OF SOLDERS

A-1 MELTING CHARACTERISTICS

A-1.1 The solidus and liquidus temperatures of different grades of solder alloys covered by this standard are given below:

Sl No.	*Grade*	*Approximately Melting Range*	
		Solidus °C	Liquidus °C
(1)	(2)	(3)	(4)
i)	Sn 63	183	183
ii)	Sn 63Af	183	183
iii)	Sn 62	179	179
iv)	Sn 60	183	191
v)	Sn 60Af	183	190
vi)	Sn 50	183	216

A-2 APPLICATIONS

A-2.0 Soft solder sticks, bars and ingots covered by this standard are intended for use in mass soldering/wave-soldering of PCB assemblies, dip soldering, roller tinning hot air leveling of printed circuits boards and tinning of components leads as follows.

A-2.1 Sn 63 and Sn 63Af

These grades have highest tensile strength, impact strength, electrical and thermal conductivity. They are intended for use in mass soldering of components mounted on to printed circuits boards, where an extremely sharp melting range is required.

A-2.1.1 Grade Sn 63 is preferred for Defence electronic applications since the soldered joints will not become brittle up to – 25°C due to the antimony content in the solder. However, the spreading characteristic of this grade is slightly inferior than grade Sn 63Af.

A-2.2 Sn 62

This grade is intended for use in soldering the silvered components, chip capacitors and in the manufacture of ceramic capacitors.

A-2.3 Sn 60 and Sn 60Af

These grades correspond closely to the tin-lead euteotic alloy with a short melting range. Solder joints to grades Sn 60 and Sn 60Af posses higher shear strength and elongation properties compared to grades Sn 63 and Sn 63Af. These grades are intended for use in soldering electronic assemblies liable for damage at high temperatures. These grades are preferred for use in professional electronic applications such as computers, communication system, medical and instrumentation.

A-2.4 Sn 50

This grade has a short melting range. The tensile strength, shear strength, electrical and thermal conductivity properties are lower than grade Sn 60. This grade is more economical due to its reduced tin content and is used for consumer electronic applications.

Bureau of Indian Standards

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. **MTD 9 (4416)**.

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *website* : www.bis.org.in

Regional Offices:		**Telephones**
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160022	260 3843 260 9285
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
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